DØ Level 3 Trigger Simulation Update

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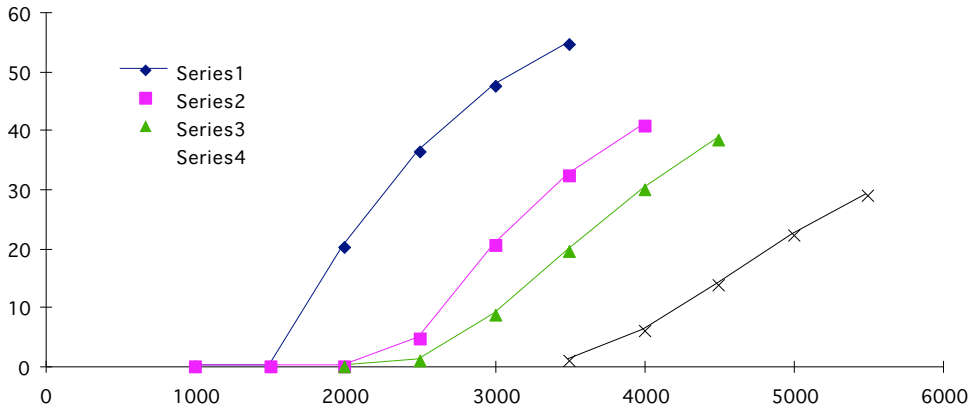
Upgrade Meeting

- Stage C & D
- Mike Fortner's Crate List

Copy of this talk: http://d0sgi0.fnal.gov/~gwatts/talks

Stage C & D

	A	B	C	D
Collectors	8	8	8	12
MCH Segments	16	16	16	24
L3 Segments	2	3	4	4
DC per Segment	4	4	4	6
L3 Nodes	48	48	64	64
50% Trigger Rate (kHz)	0.8	1.2	1.6	2.4



Mike Fortner's Crate List

- List is about a year old.
- 57 Crates
- 8 Collectors
- 162 kB/event, instead of 250 kB/event
- Crate size widths:
  - SVX Crates: 20% (JW)
  - Other Crates: 40%

SVX Crate Configuration

- SVX has $\approx$ 800K channels.
- MF's list has 6 FE crates for readout.
- Marvin claims it will have 10, perhaps more.
- Data Rate:
  - 84 kB/event
  - 5.3% occupancy
- Crate backplanes are split (2 VBD/s per crate).

# of Crates	Split Crates	Unsplit Crates
6	6.8 MB/sec	13 MB/sec
10	4.1 MB/sec	8.2 MB/sec

Fiber Tracker Configuration

- $\approx$ 70K channels
- This list has 2 front end crates (split backplane)
- Marvin claims hardware will require 4 crates.
- This list runs at 5.8% occupancy.

Occupancy Calculation

	Bytes Per HD	2			
	HDs Per Card	8			
	Cards Per Crate	8			
	Extra Bytes Per Crate	128			
	Channels Per Crate	100000			
	Bytes Per Chanel	2			
	Max Crate Size (KB)	195.3125		Number Crates	10
				Total Overhead	2560
				Total Channels	800000
				SVX Detector Size (Kb)	1565
	SVX Occupancy (%)	3			
	KB Per Crate	5.984375			
				Size Read Out (Kb)	84
				% Occupancy	5.367412141
	KB Per Crate	14			
	SVX Occupancy (%)	7.104		VME Backplane Speed (MB/sec)	20
				Event Rate (hz)	1000
				% VME used	41.015625
				VME Bandwidth Needed (per	8.203125

The Old and the New

Key Differences:

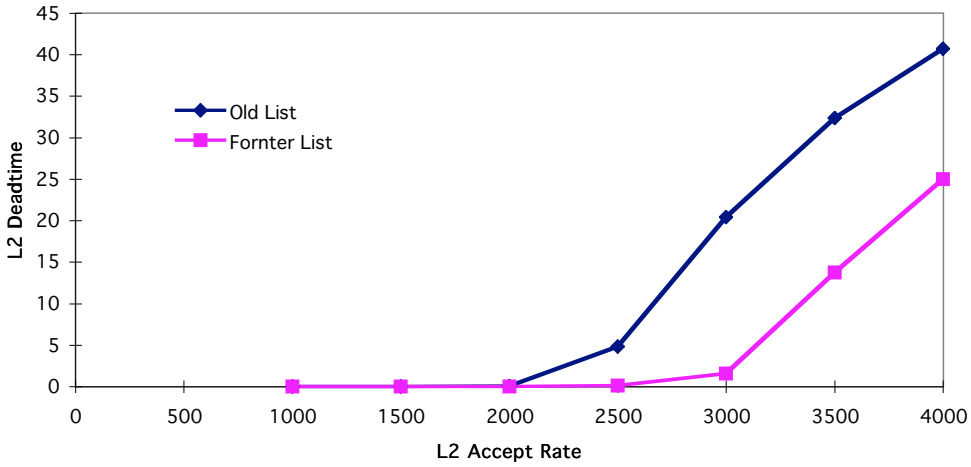
	Old List	New List
Crates	100	57
Event Size	250 kB	162
Width	10%	40%/20%

Deadtime Appears (kHz):

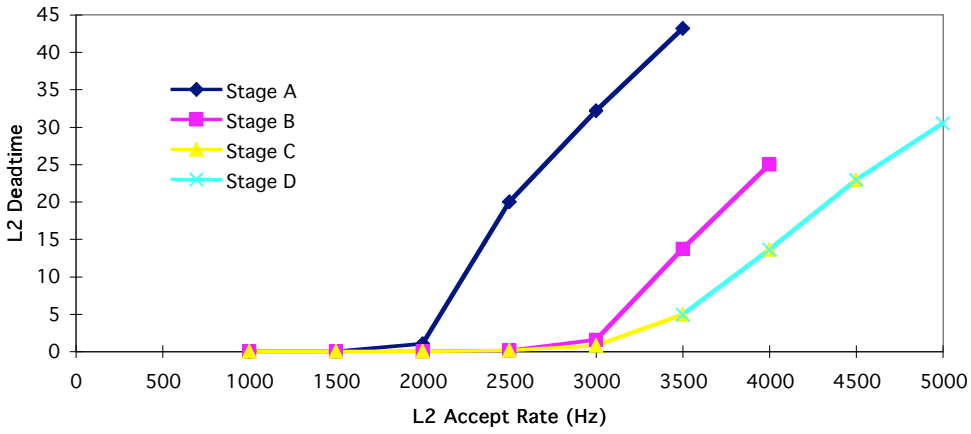
Stage	Old List	New List
A	1.5	1.7
B	2.0	2.5
C	2.5	2.8
D	xx	xx

The New and the Old

A Comparison of Stage B for the new and old crate lists:



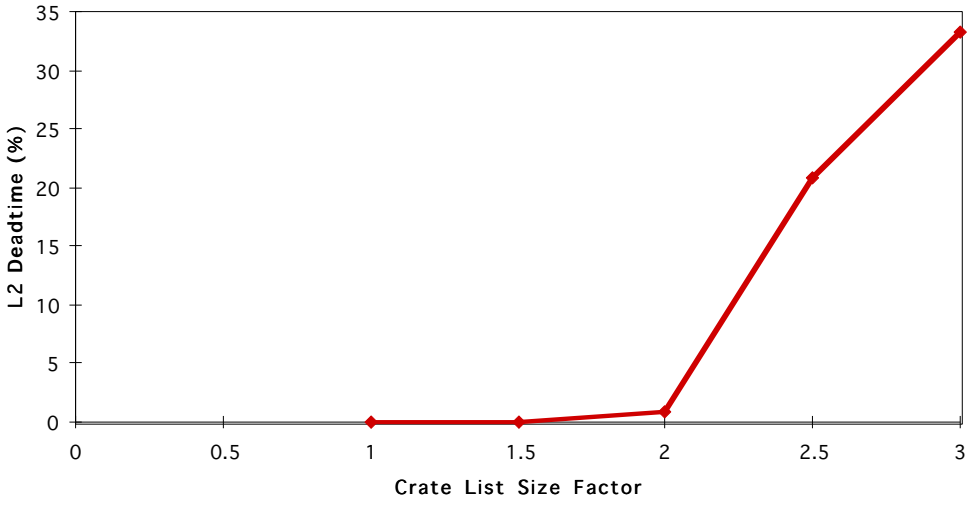
All four stages for the new crate list:



Scaling

How much room is there to spare?

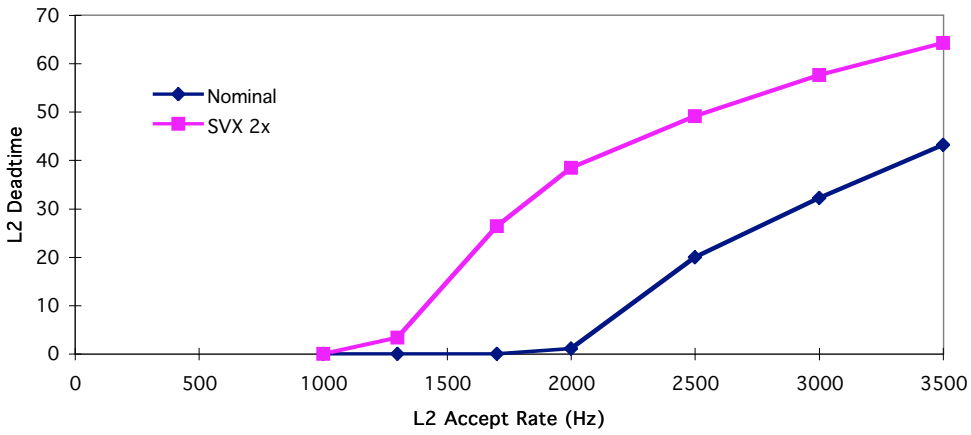
- Increase average size of all crates by a constant factor.
- Stage A
- 1000 Hz L2 Rate



Double the SVX

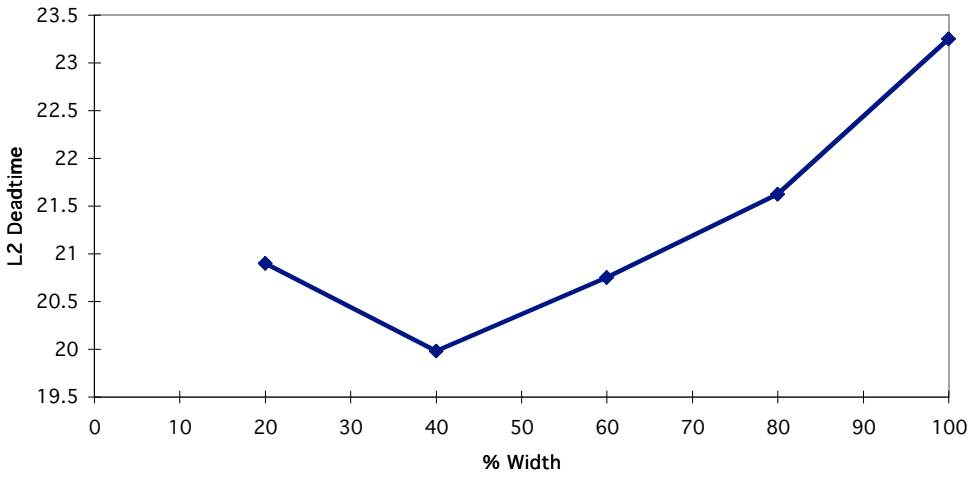
How vulnerable are we to size increases in the SVX alone?

- 5.3% & 10% occupancy.
- Stage A



Event Size

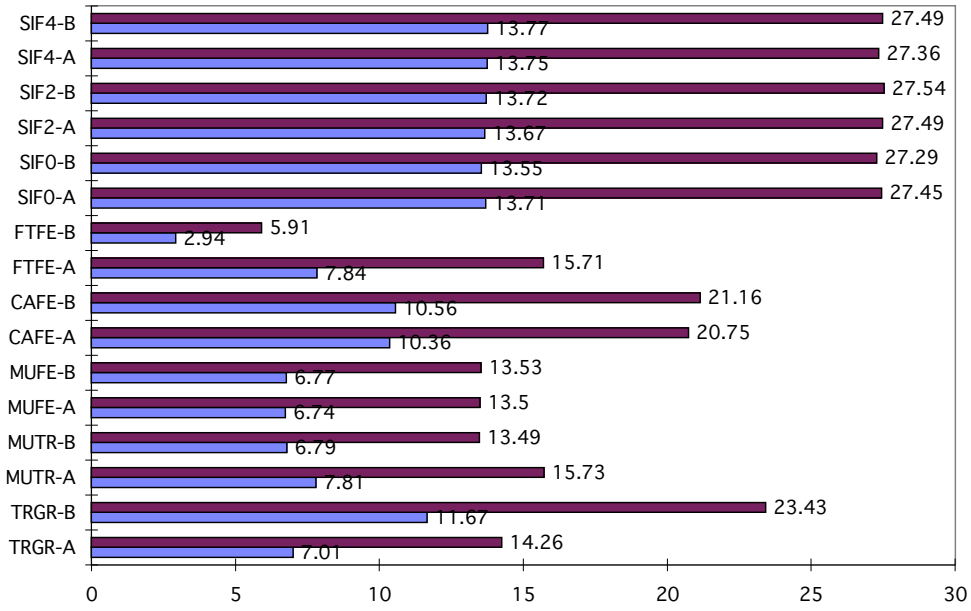
- Fix SVX at 20%.
- Stage A.
- 2500 Hz L2 accept rate.



→ Stable

Heavy Cables Usage

- Individual cable usage
- Stage A
- 1000 Hz and 2500 Hz L2 accept rate.
- 48 MB/sec is the limit.



- How we load the cables also depends upon geographic location.

Conclusions

- Crate list needs to be updated to reflect current hardware plans
  - SVX and Fiber
  - No split backplanes
- The L2 DAQ is relatively immune to event-to-event event size fluctuations.
- The L3 DAQ system stages well.

Stage A	1.5 kHz
Stage B	2.0 kHz
Stage C	2.5 kHz
Stage D	xxx kHz